Paul Philp To:

DOE Project Manager, Run IIb CDF Detector Project

From: Pat Lukens

Project Manager for the Run IIb CDF Detector Project

Run IIb CDF Detector Project January 2005 Report **Subject:**

Attached is the monthly report summarizing the January 2005 activities and progress for the Fermilab RunIIb CDF Detector Project. This report is available electronically at:

http://www-cdf.fnal.gov/run2b.html

electronic cc: J. Appel

Arroyo E.

Benjamin D.

H. Frisch

D. Hoffer

J. Huston

R. Hughes

E. James

YK Kim

D. Knapp

Knuteson B.

Kuhlmann S.

T. Liu

J. Livengood

Lipton R.

P. Lukens

T. Miao

H. Montgomery

O'Dell

V. Pavlicek

K. Pitts

L. Ristori

R. Roser

Sarlina TJ

Shochet M.

K. Stanfield

J. Strait

Temple E.

D. Toback

C. Trimby

V.

White

P. Wilson

Winer В.

Witherell M.

RunIIb CDF Detector Project Progress Report No. 26 1 - 31 January 2005

I. PROJECT DESCRIPTION

The primary goal of the CDF Run IIb Detector Project is to enable the detector to exploit the physics opportunities available during Tevatron operation through 2008. The data from Run II will represent a set of detailed measurements that can be compared with the predictions of the Standard Model at the highest available collision energy. The increased size of the data sample will allow us to study the top quark by measuring the details of its production and decay mechanism. In addition, we plan precision electroweak and QCD measurements, continued searches for a variety of phenomena that are predicted to exist beyond the Standard Model framework, and to explore CP violation in the *b* quark sector. The detailed physics goals of the upgrade are described in the Technical Design Report (TDR).

The major tasks of this upgrade are:

- Upgrade the calorimeter by replacing the Central Preradiator Chamber with a device with shorter response time to allow operation in a high-luminosity environment, and adding timing information to the electromagnetic calorimeters.
- Upgrade the data acquisition and trigger systems to increase throughput needed for higher luminosity operation and efficiently trigger on the higher multiplicity events of Run IIb.

II. OVERVIEW OF PROJECT STATUS – P. Lukens

The project had a Director's Review on 18-19 January 2005. The current status of the project was shown, along with revised estimates of cost and schedule. Final cost numbers for the silicon subproject were shown, and estimates for the new TDC modifications were presented. Change Requests for these are anticipated for February 2005. The review went well. The committee was satisfied with our progress and current estimates of the cost to complete the Project.

Our current projection is that portions of the Project that require a shutdown of the experiment and access to the collision hall will be complete by 3 August 2005.

III. PROJECT MILESTONE SUMMARY (as of 31 January 2005)

CDF Data Acquisition & Trigger (L1 and L2) Milestones Sorted by Baseline Completion Date

| WBS | Title | Baseline Comp. Date | Forecast/Actual Completion Date | Complete |
|---------------|--|------------------------|---------------------------------|----------|
| 1.3.2.6.3 | Begin production of Level 2 Pulsar system | 12 Nov 03 | 12 Nov 03 | Yes |
| 1.3.1.6.6 | First Prototype TDC available for testing | 19-Nov-03 | 16-Feb-04 | Yes |
| 1.3.4.4.1.4 | Prototype Event Builder hardware arrives | 3-Jun-04 | 31 Mar 04 | Yes |
| 1.3.2.10 | Pulsar Hardware Ready for Installation | 31-Aug-04 | 20-Aug-04 | Yes |
| 1.3.6.1.1.7 | Begin AMS Design Work | 1-Sept-04 | 2-Aug-04 | Yes |
| 1.3.6.1.3.7 | Begin Track Fitter Design | 1-Sept-04 | 2-Aug-04 | Yes |
| 1.3.4.5.3 | Production Readiness Review - Event Builder | 4-Oct-04 | 2-Jun-04 | Yes |
| 1.3.4.5.4.4 | Arrival of the Event Builder hardware | 15-Oct-04 | 15-Oct-04 | Yes |
| 1.3.11.8.5.5 | Begin Purchase of Pulsar Board components | 20-Oct-04 | 4-Nov-04 | Yes |
| 1.3.11.5.3.8 | Begin Production TDC Mezzanine Card | 28-Oct-04 | 3-Nov-04 | Yes |
| 1.3.6.2.6.4 | Begin Ampchip Production | 10-Jan-05 | 22-Nov-04 | Yes |
| 1.3.6.2.1.1.5 | Begin AMS Mezzanine Card Production | 14-Jan-05 | 11-Nov-04 | Yes |
| 1.3.1.17.4 | TDC Readout System Complete | 21-Jan-05 | 10-Dec-04 | Yes |
| 1.3.11.6.3.6 | All TDC to Finder cables Received | 18-Mar-05 | 11-Apr-05 | |
| 1.3.5.3.7 | Arrival of 15 PCs from the vendor | 23-Mar-05 | 18-Mar-05 | |
| 1.3.2.9 | Pulsar Level 2 subproject ready for installation | 1-Apr-05 | 28-Feb-05 | |
| 1.3.11.8.8 | Begin Joint Testing with Finder Board | 4-Apr-05 | 2-May-05 | |
| 1.3.11.7.5.8 | Begin Production of SLAM Boards | 18-Apr-05 | 3-May-05 | |
| 1.3.11.4.4.8 | Begin Production TDC Fiber Transition Boards | 21-Apr-05 | 18-Apr-05 | |
| 1.3.11.5.3.9 | Checkout of TDC Mezzanine Cards Complete | 6-Jun-05 | 13-May-05 | |
| 1.3.11.2.5.1 | Begin Production XFT Finder Boards | 8-Jun-05 | 23-May-05 | |
| 1.3.6.1.2.5 | Hit Buffer Firmware Complete for Board Test | 23-Jun-05 | 14-Jun-05 | |
| 1.3.6.1.3.5 | Track Fitter Firmware Complete for Board Test | 28-Jun-05 | 31-Mar-05 | |
| 1.3.1.12.6 | Installation of Modified TDC's Complete | 27-July-05 | 27-July-05 | |
| 1.3.4.8 | Finish Event-Builder Upgrade | 28-July-05 | 29-Jun-05 | |
| 1.3.10.2 | Ready for Accelerator Shutdown 2005 | 8-Aug-05 | 3-Aug-05 | |
| 1.3.1.12.8 | TDC Modification Complete | 10-Aug-05 | 10-Aug-05 | |
| 1.3.5.5.5 | Arrival of 70 Level3 and 15 DAQ PCs | 15-Aug-05 | 15-Aug-05 | |
| 1.3.5.6.5 | Arrival of 140/20 PCs from the vendor | 15-Aug-05 | 15-Aug-05 | |
| 1.3.6.1.1.5 | AMS Firmware Complete for Board Test | 19-Aug-05 | 14-Apr-05 | |
| 1.3.6.3 | SVT ready for installation | 25-Aug-05 | 9-Aug-05 | |
| 1.3.5.8 | Finish Purchase of Computers for L3 DAQ system | 6-Sept-05 | 6-Sept-05 | |
| 1.3.11.4.4.9 | Checkout of TDC Transition Boards Complete | 16-Sept-05 | 3-Aug-05 | |
| 1.3.11.7.5.9 | Checkout of SLAM Boards Complete | 28-Sept-05 | 1-Sept-05 | |
| 1.3.11.2.5.10 | Finder Board Checkout Complete | 29-Sept-05 | 22-Sept-05 | |
| 1.3.11.10 | XFT Ready for Installation at CDF | 29-Sep-05 | 22-Sep-05 | |
| 1.3.8 | Finish Run 2b Trigger DAQ project | 30-Sep-05 | 22-Sept-05 | |
| 1.3.9 | DAQ and Trigger Upgrades Ready for Installation | 17-Jan-06 | 22-Sept-05 | |

| D | Name | Forecast | Baseline | Variance | 2004 2005 |
|----|--|----------|----------|-----------|-------------------------|
| 74 | Begin production of Level2 Pulsar system | 11/12/03 | 11/12/03 | 0 wks | Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 |
| 67 | First Prototype TDC available for testing | 2/16/04 | 11/19/03 | 11.35 wks | * |
| 41 | Arrival of the prototype Event Builder hardware | 3/31/04 | 6/3/04 | -9 wks | ** |
| 84 | Pulsar Hardware Ready for Installation | 8/20/04 | 8/31/04 | -1.4 wks | ^~ |
| 08 | Begin AMS Design Work | 8/2/04 | 9/1/04 | -4.4 wks | |
| 22 | Begin Track Fitter Design | 8/2/04 | 9/1/04 | -4.4 wks | |
| 50 | Event Builder Production Readiness Review | 6/2/04 | 10/4/04 | -17 wks | + • |
| 55 | Arrival of the Event Builder hardware | 10/15/04 | 10/15/04 | 0 wks | ^ 👗 |
| 18 | Begin Purchase of Pulsar Board components | 11/4/04 | 10/20/04 | 2 wks | |
| 66 | Begin Production TDC Mezzanine Card | 11/3/04 | 10/28/04 | 0.8 wks | |
| 68 | Begin Ampchip Production | 11/22/04 | 1/10/05 | -5.8 wks | |
| 33 | Begin AMS Mezzanine Card Production | 11/11/04 | 1/14/05 | -8.2 wks | |
| 77 | Receipt of TDC to Finder cables Complete | 4/11/05 | 3/18/05 | 3.2 wks | |
| 73 | Arrival of 15 PCs from the vendor | 3/18/05 | 3/23/05 | -0.6 wks | |
| 38 | Pulsar Level 2 subproject ready for installation | 2/28/05 | 4/1/05 | -4.6 wks | |
| 21 | Begin Joint Testing with Finder Board | 5/2/05 | 4/4/05 | 3.8 wks | |
| 04 | Begin Production of SLAM Boards | 5/3/05 | 4/18/05 | 2.2 wks | |
| 49 | Begin Production TDC Fiber Transition Boards | 4/18/05 | 4/21/05 | -0.6 wks | |
| 08 | TDC Readout System Complete | 12/10/04 | 6/6/05 | -23.8 wks | * |
| 67 | Checkout of TDC Mezzanine Cards Complete | 5/13/05 | 6/6/05 | -3 wks | |
| 12 | Begin Production XFT Finder Boards | 5/23/05 | 6/8/05 | -2.2 wks | |
| 14 | Hit Buffer Firmware Complete for Board Test | 6/14/05 | 6/23/05 | -1.6 wks | |
| 20 | Track Fitter Firmware Complete for Board Test | 3/31/05 | 6/28/05 | -12.6 wks | |
| 46 | Installation of Modified TDC's Complete | 7/27/05 | 7/27/05 | 0 wks | |
| 64 | Finish Event-Builder Upgrade | 6/29/05 | 7/28/05 | -4 wks | |
| 52 | TDC Modification Complete | 8/10/05 | 8/10/05 | 0 wks | |
| 88 | Arrival of 70 Level3 and 15 DAQ PCs from the vendor | 8/15/05 | 8/15/05 | 0 wks | |
| 95 | Arrival of 140/20 PCs from the vendor | 8/15/05 | 8/15/05 | 0 wks | |
| 06 | AMS Firmware Complete for Board Test | 4/14/05 | 8/19/05 | -18 wks | |
| 70 | SVT ready for installation | 8/9/05 | 8/25/05 | -2.4 wks | |
| 98 | Finish Purchase of Computers for Level3/DAQ system | 9/6/05 | 9/6/05 | 0 wks | |
| 50 | Checkout of TDC Transition Boards Complete | 8/3/05 | 9/16/05 | -6.2 wks | |
| 05 | Checkout of SLAM Boards Complete | 9/1/05 | 9/28/05 | -3.6 wks | |
| 21 | Finder Board Checkout Complete | 9/22/05 | 9/29/05 | -1 wk | |
| 23 | XFT Ready for Installation at CDF | 9/22/05 | 9/29/05 | -1 wk | |
| 72 | Finish Run 2b Trigger DAQ project | 9/22/05 | 9/30/05 | -1 wk | |
| 77 | Ready for Accelerator Shutdown 2005 | 8/3/05 | 8/8/05 | -0.4 wks | |
| 73 | Data Acquisition and Trigger Upgrades Ready for Installation | 9/22/05 | 1/17/06 | -15 wks | _ |

Project: CDF RunIIb DAQ Staus Date: 1/31/05 Print Date: 2/16/05 Completed Milestone
Current Forecast

Baseline Milestone



CDF Calorimeter Level 1 and Level 2 Milestones Sorted by Baseline Completion Date

| WBS | Milestone | Baseline Completion Date | Forecast/Actual Completion Date | Complete |
|--------------|---|-----------------------------|---------------------------------|----------|
| 1.2.1.10.1 | First phototube order placed | 9-May-03 | 1-Apr-03 | Yes |
| 1.2.2.2.7.1 | Prototype testing complete | 16-May-03 | 28-Mar-03 | Yes |
| 1.2.2.2.7.4 | ASD->TDC Cables ready for installation | 16-May-03 | 26-Aug-03 | Yes |
| 1.2.2.2.7.2 | CEM Splitters ready for installation | 19-May-03 | 29-Jul-03 | Yes |
| 1.2.2.2.7.3 | PEM Harnesses ready for installation | 2-Sep-03 | 28-Apr-03 | Yes |
| 1.2.2.2.7.5 | All EMT cables done and ready to install | 2-Sep-03 | 26-Aug-03 | Yes |
| 1.2.2.2.7.8 | VME Crate ready for installation | 7-Oct-03 | 30-Apr-03 | Yes |
| 1.2.1.10.3 | First set of Calorimeter phototubes tested | 20-Oct-03 | 20-Oct-03 | Yes |
| 1.2.2.2.7.10 | Upstairs components ready to install | 7-Jan-04 | 16-Oct-03 | Yes |
| 1.2.2.2.7.11 | All EM Timing components ready to install | 7-Jan-04 | 16-Oct-03 | Yes |
| 1.2.2.2.7.6 | ASD/TB ready for installation | 7-Jan-04 | 16-Oct-03 | Yes |
| 1.2.2.2.7.7 | Downstairs components ready to install | 7-Jan-04 | 16-Oct-03 | Yes |
| 1.2.2.2.7.9 | TDC boards ready for installation | 7-Jan-04 | 16-Oct-03 | Yes |
| 1.2.1.10.2 | 1 st Calorimeter WLS fiber holder finished | 1-Apr-04 | 17-Feb-04 | Yes |
| 1.2.1.10.4 | 1 st CPR module finished and tested | 4-Jun-04 | 15-Mar-04 | Yes |
| 1.2.1.10.6 | 1 st CCR module finished and tested | 19-Jul-04 | 2-Mar-04 | Yes |
| 1.2.1.10.5 | 2 nd set of Calorimeter phototubes tested | 6-Aug-04 | 26-Mar-04 | Yes |
| 1.2.1.10.7 | 50% Calorimeter CPR Detectors Tested | 14-Jan-05 | 30 June 04 | Yes |
| 1.2.1.10.8 | 50% Calorimeter CCR Detectors tested | 14-Feb-05 | 25 Aug 04 | Yes |
| 1.2.1.10.9 | Final Calorimeter CPR Detector Tested | 15-Apr-05 | 25 Aug 04 | Yes |
| 1.2.1.10.10 | Final Calorimeter CCR Detector Tested | 15-Apr-05 | 15-Oct-04 | Yes |
| 1.2.1.10.11 | Final set of Calorimeter phototubes tested | 6-May-05 | 6-June-04 | Yes |
| 1.2.1.10.12 | End of Central Pre-shower Project | 6-May-05 | 28-Jan-05 | Yes |
| 1.2.3.5 | End of Calorimeter Project: Level 2 | 6-May-05 | 28-Jan-05 | Yes |
| 1.2.3.6 | End of Calorimeter Project: Level 1 | 23-Jan-06 | 28-Jan-05 | Yes |

IV. PROCUREMENT – P. Lukens

No significant procurements were placed in January, 2005.

V. PROJECT HIGHLIGHTS

1.2 – Calorimeter

1.2.1 Central Preshower and Crack Detector – Steve Kuhlmann

The CDF Preshower/Crack Upgrade is complete. All spares have been completed. Both detectors have been calibrated with proton-antiproton collision data and are integrated into the offline reconstruction software. More than 99.7% of all channels are working. Good separation between minimum ionizing tracks and W electrons has been demonstrated.

1.3 – Data Acquisition and Trigger

1.3.1 TDC (Time to Digital Converter) – Eric James

TDC modification began in the second week of January. A total of 39 boards out of 300 to be modified were finished by month's end. Testing indicated that the modifications were successfully implemented on the first attempt for 28 out of the first 29 boards to be modified. Testing and re-calibration of modified boards is underway at the University of Michigan. A complete plan for testing and installing the modified boards at CDF is being finalized. We expect that all spare boards will be done by the end of February and that the replacement of unmodified boards on the detector will begin on the same time-scale.

| Month | Board Mo | dification | Testing a | t Michigan | Detector Installation | | | |
|----------|----------|------------|-----------|------------|------------------------------|-----------|--|--|
| WOITH | Complete | Remaining | Complete | Remaining | Complete | Remaining | | |
| January | 39 | 261 | 9 | 291 | 0 | 233 | | |
| February | | | | | | | | |
| March | | | | | | | | |
| April | | | | | | | | |
| May | | | | | | | | |
| June | | | | | | | | |

1.3.2 Level 2 – Ted Liu

Much of the work during January has focused on getting the system ready for initial operation. This has been very successful and by the end of January we were running with the rest of the system in parasitic mode. Firmware is all finalized and working well.

1.3.11 XFT (eXtremely Fast Tracker) II – Richard Hughes, Brian Winer

SLAM Boards: A fully loaded SLAM board was received in January and testing has begun. We have verified all of the input and output data paths. We have also tested the loading of the FPGA's from the flash RAM. All of the tests to this point have been successful and we are extremely please with the progress so far. A second preproduction board was sent to the vendor to be loaded with parts. We expect to receive a partially loaded board in February.

XTC Cards: The 200 production XTC 2 boards were submitted in December and received in January. Most of the parts for the production boards were received as well. The first assembled production boards are anticipated in February. Test stand software development for production check-out is ready and awaiting the arrival of the assembled production boards. Work is also proceeding on developing testing code to run in the B0 TDC test crate, so that XTC 2 boards can be tested and installed on the detector over the next several months.

Cabling: Work is also continuing on the fiber optic data path. Minor modifications have been made to the prototype transition modules and transmit (Tx) mezzanine boards. The plan is to use a Pulsar board as a data sink to test the XTC2 and fiber optic data path at full speed. We are also pursuing the option of running the optical link at higher frequency (75MHz versus 60MHz) to reduce data transmission time.

Stereo Finder: We have received 4 of the 5 Stereo XFT modules we ordered. Two boards have been found to have direct shorts between 3.3V and GND. One of the boards has been sent back to the manufacturer and we have just requested an RMA for the 2nd board so that it, too, can be sent back.

We have been working with one board and has successfully loaded the VME_Slave FPGA configuration PROM via JTAG. The VME_Slave FPGA now downloads from PROM on power-up. We're just beginning to look at VME operations, but so far things are looking good.

1.3.4 Event Builder – Bruce Knuteson

January – Progress has been made toward the completion of the Level 3 Builder, the interface from the Event Builder to the Level 3 Farm. This is the last major piece of the Event Builder framework left to be written. The Event Builder interface to the Error Logger has largely been completed.

1.3.6 SVT (Silicon Vertex Tracker) – Mel Shochet

AM++:

Standard cell chip production has started and the chips are expected to be ready at the end of April. Tests of produced chips at Microtest have also been ordered. A set of test vectors has been translated into the Microtest format. The test stand at Microtest has been successfully tested with known prototypes.

The second generation prototypes for both the AM++ and LAMB have been successfully tested in Pisa at 33 and 40 MHz. An AM++ with 4 LAMBs have been sent to Fermilab for tests on the experiment.

AMS/RW:

Firmware for the RW functionality has been developed and simulated. It is ready for tests in the Pulsar.

Hit Buffer:

The complete draft firmware specification was reviewed by both SVT and Pulsar experts. The important issue of quickly clearing the Hit Count Memory was raised and a solution found that can achieve the operational equivalent of clearing the HCM in a single clock cycle. Final discussions of the firmware are underway, including understanding which existing Pulsar and Track Fitter firmware can be used in the Hit Buffer. Firmware writing is expected to start next during February.

Track Fitter:

The firmware for the Track Fitter has been written. Simulation will resume in February. During January, focus shifted to testing the prototype mezzanine cards at full speed inside a Pulsar board.

Mezzanine Memory Cards:

Prototype mezzanine cards were tested in a Pulsar board and shown to work up to 65 MHz for reading and writing. The parts for the rest of the large memory mezzanine boards were ordered, most of them were received, and the PC boards are in the process of being ordered. The small memory board design will be finished next month.

VI. FINANCIAL STATUS (as of 31 January 2005)

The baseline cost of the Project is \$10,375K, consisting of Run IIb Project costs (\$8,702K) plus the closeout costs of the silicon detector upgrade (\$1,673K), which will no longer be constructed.

Current Financial Tracking Report - The table below contains current values for selected financial tracking quantities that do not appear in the standard Obligations or Cost Performance Reports. For the Silicon Detector portion of the project, we assume a BAC of \$1673K and obtain the ACWP from the Obligations report. Remaining portions of the project have their costs listed in the Cost Performance Report.

| | ACWP | | BCWP | | BAC | | Cont. | EAC | ETC | Complete |
|-----------|---------|---------|---------|---------|---------|---------|-------|------|------|----------|
| | Silicon | Non-Sil | Silicon | Non-Sil | Silicon | Non-Sil | | | | |
| Aug 2004 | 1321 | 1357 | 1321 | 1893 | 1673 | 5734 | 2967 | 6871 | 7160 | 43% |
| September | 1342 | 1842 | 1342 | 2002 | 1673 | 5734 | 2967 | 7247 | 7030 | 45% |
| October | 1342 | 1957 | 1342 | 2125 | 1673 | 5254 | 3448 | 6759 | 6908 | 50% |
| November | 1357 | 2081 | 1357 | 2366 | 1673 | 5254 | 3448 | 6642 | 6652 | 54% |
| December | 1341 | 2199 | 1341 | 2673 | 1673 | 5254 | 3448 | 6453 | 6361 | 58% |
| Jan 2005 | 1341 | 2277 | 1341 | 2909 | 1673 | 5254 | 3448 | 6295 | 6125 | 61% |

CDF RunIIb Obligations Report - This report provides a Level 2 summary of outstanding Purchase Orders (PO) where money has been committed but for which the Project has not been invoiced. This does not include requisitions in the system where a Fermilab PO number has not yet been assigned. A brief description of the columns included in this report is given below:

- Current Month Total Cost The cost charged to the project for the reporting month.
- Current Month Obligation Obligations made against the project in the reporting month.
- Year to Date (YTD) Total Cost The total cost charged to the project in this fiscal year.
- YTD Obligations w/Indirect Total obligations against the project for this fiscal year.
- Current Purchase Orders Open Commitment This is the total of the open commitments against the project. It includes open commitments from the current and all prior years.
- Prior Year Total Cost This is the total cost charged to the project in all prior fiscal years.

The total project cost is simply the sum of the Year-to-Date costs and the Prior Year costs. The total committed and spent is the Total Project Cost plus the Open Commitment value.

CDF Project Obligations Report Through 31 January 2005

| CDF RIIb EQU - | January FY05 IN | \$K | | | | | | |
|----------------|-------------------------|-----------------|--------------------------------|--------------------------------|----------------------|----------------------------------|-------------------------|---------------------------|
| Task Number | Expenditure Category | | Current Month Total Cost | Current Month Obligation | YTD Total Cost | YTD Obligations w/Indirect | Current PO Open Comm | Prior Yr Total Cost |
| Silicon | | M&S | 0.0 | (1.0) | 3.3 | (100.2) | 0.0 | 539.0 |
| | | SWF | 0.0 | 0.0 | (1.1) | (1.1) | 0.0 | 571.1 |
| | | ОН | 0.0 | 0.0 | (2.1) | (2.1) | 0.0 | 230.9 |
| | | Total 1.1 | 0.0 | (1.0) | 0.0 | (103.4) | 0.0 | 1,341.0 |
| | | | | | | | | |
| Calorimeter | | M&S | 11.3 | 3.4 | 40.8 | 4.1 | 6.8 | 211.8 |
| | | SWF | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 139.1 |
| | | ОН | 0.2 | 0.0 | 0.7 | 0.7 | 0.0 | 51.5 |
| | | Total 1.2 | 11.5 | 3.4 | 41.5 | 4.8 | 6.8 | 402.3 |
| T: (D.1.0 | | 1100 | 10.1 | 222.2 | 470.0 | 0.17.0 | 700.0 | 700.0 |
| Trigger/DAQ | | M&S | 12.1 | 222.0 | 170.8 | 847.2 | 733.9 | 708.2 |
| | | SWF | 27.2 | 27.2 | 100.6 | 100.6 | 0.0 | 220.7 |
| | | OH Total 1.3 | 10.2 49.4 | 0.0 249.1 | 57.0 328.4 | 57.0 1,004.8 | 0.0 733.9 | 129.2 |
| | | 10(a) 1.3 | 49.4 | 249.1 | 320.4 | 1,004.6 | 133.9 | 1,058.1 |
| Administration | | M&S | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 29.1 |
| Administration | | SWF | 12.8 | 12.8 | 50.0 | 50.0 | 0.0 | 268.2 |
| | | ОН | 3.9 | 0.0 | 15.2 | 15.2 | 0.0 | 84.4 |
| | | Total 1.4 | 16.8 | 12.9 | 65.3 | 65.3 | 0.0 | 381.7 |
| Total Proje | | Mec | 22.5 | 224.4 | 245.0 | 754.0 | 740.7 | 1 400 0 |
| Total Proje | ect | M&S | 23.5 | 224.4 | 215.0 | 751.2 | 740.7 | 1,488.2 |
| | | SWF OH | 40.0 | 40.0 0.0 | 149.5 70.8 | 149.5 70.8 | 0.0 0.0 | 1,199.0 495.9 |
| Grand To | tal | UH | 14.3 77.7 | | 435.2 | 971.4 | | |
| Grand 10 | ldi | | 11.1 | 264.4 | 435.2 | 9/1.4 | 740.7 | 3,183.1 |

Total Project Cost (Inception To Date) = 3,618.4

CDF Project Cost Performance Report (CPR) – This report is generated from COBRA and provides a summary of the WBS 1.2-1.4 costs of the Project down to Level 3 of the Work Breakdown Structure. Silicon detector subproject closeout costs are not tracked here. Input data originates with the status (% Complete) of the Project schedules as reported by the Level 2 managers and actual costs extracted from the Fermilab accounting system. Where possible, costs are accrued for items that have been delivered, but not yet invoiced. This is only possible for a small fraction of our cost. Financial summaries are shown for this reporting period (columns 2-6) as well as the project to date (columns 7-11). Column 12 contains our baseline BAC, and will only be changed after the formal implementation of the Change Control process. Column 13 is the projected BAC, based on the current month's schedule. A number of specialized financial terms and abbreviations used in the CPR are defined here for convenience:

ACWP – Actual Cost of Work Performed. The actual cost of completed tasks.

BAC – Budget at Completion. Estimated total project cost when completed. Equivalent to the BCWS at completion. BCWS baseline value is found in column 12 of the CPR.

BCWP – Budgeted Cost of Work Performed. The scheduled cost profile of completed tasks.

BCWS – Budgeted Cost of Work Scheduled. This is the sum of the budgets for all planned work to be accomplished within a given time period.

$$CV - Cost Variance$$
. $CV = BCWP - ACWP$

EAC – Estimate At Completion. This is the ACWP to date, plus the BCWS (current scheduled estimate) of remaining tasks. EAC = (BAC (current) - BCWP) + ACWP

ETC – Estimate to Completion. ETC = EAC - ACWP + Contingency

Percent Complete -
$$\%Com = \frac{BCWP}{BAC}$$

SV - Schedule Variance. SV = BCWP - BCWS

CDF Project Cost Performance Report Through 31 January 2005

| Cost Performance Report - Work Breakdown Structure | | | | | | | | | | | | | |
|---|------------------|----------------|--------------|------------------|----------------|--------------------|--------------------|------------------------------|-------------------|------------|-----------|--------------------|----------|
| Contractor: | | | | Contract T | 31 | | | Project Name/No: Report Peri | | | | | |
| Location: | | | | | | | | | | 12/31/2004 | 1/31/2005 | | |
| Quantity | Negotia | ted Cost | Est. Cost A | | _ | Profit/ | Tgt. | Est | Share | Contract | Esti | mated Cont | ract |
| | | | Unprice | d Work | Fee | e % | Price | Price | Ratio | Ceiling | | Ceiling | |
| 1 | 8,70 | , | |) | 0 | 0.00 | 8,701,999 | | | 0 | 0 0 | | |
| Funding Type-CA | | С | urrent Perio | od | | | Cu | mulative to | Date | | А | t Completio | n |
| WBS[2] | | | Actual | | | . | | Actual | ., | | | | |
| WBS[3] | Budget | | Cost | Varia | ance | Budget | | Cost | Var | iance | | Latest | |
| ,, | Work | Work | Work | 0 | | Work | Work | Work | | | 5 | Revised | |
| Item | Scheduled | Performed | Performed | Schedule | Cost | Scheduled | Performed | Performed | Schedule | Cost | Budgeted | Estimate | Variance |
| EQU Equipment | | | | | | | | | | | | | |
| 1.2 Calorimeter Upgrades | | 0.000 | 44.450 | 0.000 | 0.000 | 077 440 | 077 440 | 400.000 | 0 | 40.040 | 077 440 | 077 440 | 0 |
| 1.2.1 Central Preshower and Crack Detectors | 0 | 2,396 | 11,456 | 2,396 | -9,060 | | 377,440 | -, | 0 | , | , , | 377,440 | 0 |
| 1.2.2 Electromagnetic timing | 0 | 0 | 0 | 0 | 0 | 35,630 | 35,630 | 23,403 | 0 | , | | 35,630 | 0 |
| WBS[2]Totals: | 0 | 2,396 | 11,456 | 2,396 | -9,060 | 413,070 | 413,070 | 443,491 | 0 | -30,421 | 413,070 | 413,070 | 0 |
| 1.3 Run 2b DAQ and Trigger Project | 7 007 | 0.077 | 4.405 | 0.500 | F 400 | E 4 E 000 | E40 E44 | 407.075 | C7.F | E0.000 | E40 E44 | 744 404 | 404.000 |
| 1.3.1 Run 2b TDC Project 1.3.2 Run 2b Level 2 Project | 7,087 | 9,677 7.315 | 4,185 | 2,590 | 5,492 1.883 | 545,866 | 546,541 | 487,875 352.591 | 675 | , | | 741,434 | 194,893 |
| 1.3.4 Event-Builder Upgrade | 44,687 | 51.750 | 5,432 421 | -37,372 | , | 359,585 | 371,401 316.426 | 114.195 | 11,816 -59.724 | , | | 438,964 559.395 | 1,729 |
| 1.3.5 Computer for Level3 PC Farm / DAQ | 42,707 55,979 | 51,750 | 421 | 9,043 -55,979 | 51,329 | 376,150 173,270 | 159,801 | 210,333 | -39,724 | - , - | | 479,403 | 41,216 |
| 1.3.6 SVT upgrade | 49.765 | 66.004 | 0 | 16.239 | 66.004 | | 108.746 | , | -83.618 | , | | 362.407 | 81.487 |
| 1.3.11 Revised XFTII Project | 75,862 | 48,291 | 100,365 | -27,571 | -52,074 | - , | 398,689 | _ | -131,510 | , - | , | , - | 15,129 |
| WBS[2]Totals: | 276,089 | 183,038 | 110,404 | -93,051 | | | , | 1,386,848 | -275,830 | | 3,882,406 | | 334,453 |
| 1.4 Administration | 270,000 | 100,000 | 110,707 | 33,031 | 12,004 | 2,177,404 | 1,501,004 | 1,500,040 | 270,000 | 314,730 | 3,002,400 | 4,210,000 | 334,433 |
| 1.4.3 Construction Phase | 23,746 | 22,092 | 16.786 | -1,655 | 5,306 | 596.947 | 594,469 | 447.008 | -2.478 | 147.461 | 958.867 | 958.859 | -8 |
| WBS[2]Totals: | 23,746 | 22,092 | 16,786 | -1,655 | 5.306 | | 594,469 | 447.008 | -2.478 | , - | 958.867 | 958.859 | -8 |
| Funding Type-CATotals: | 299,835 | 207,525 | 138,645 | -92,310 | - , | 3,187,451 | , | , | -278,308 | , - | 5,254,343 | , | 334,446 |
| Sub Total | 299,835 | 207,525 | 138,645 | -92,310 | • | | | 2,277,347 | • | , | 5,254,343 | | 334,446 |
| Management Resrv. | 200,000 | | | 0=,010 | 55,500 | 2,.3.,.01 | _,000,.10 | _,, | 0,000 | 22.,.00 | 3,447,656 | | -334,446 |
| Total | 299,835 | 207,525 | 138,645 | -92,310 | 68,880 | 3,187,451 | 2,909,143 | 2,277,347 | -278,308 | 631,796 | 8,701,999 | | 0 |

VII. VARIANCE ANALYSIS – P. Lukens

| Subproject | Schedule Variance | Cost Variance |
|-------------------------------|---|--|
| Calorimeter Schedule | Subproject Complete | Subproject Complete |
| Run 2b TDC | Not significant. | Variance shown is due to the new estimate for modifications to the old devices. This will become a formal baseline change. |
| Run 2b Level 2 | Ahead of schedule | Not Significant |
| Run 2b XFTII | Finder submission is behind by a month, then there were vendor problems (since resolved). | Not Significant |
| Event Builder | An element of this related to TDC readout is behind schedule. | Costs are low. Some engineering has been done with physicist (no cost) labor. |
| Computers for Level 3 and DAQ | Ahead of schedule | The price of Level 3 computers purchased in September, 2004 was higher than budgeted. |
| SVT Upgrade | None | Recent vendor quotes were higher than planned, so new estimate has risen. |
| Administration | None | Costs for support and travel have been below estimates. |

VIII. BASELINE CHANGES

There were no Change Control documents submitted during January 2005.

IX. FUNDING PROFILES

The funding profile for the RunIIb CDF Detector Project is shown below:

| | Funding Plan in Current Year \$K | | | | | | | | | |
|-----------------------|----------------------------------|----|-------|----|-------|----|-------|----|--------|--|
| | FY02 | | FY03 | | FY04 | | FY05 | | Total | |
| DOE MIE | \$ 3,460 | \$ | 3,509 | \$ | 1,673 | \$ | 1,732 | \$ | 10,375 | |
| DOE R&D | \$ 1,670 | \$ | 480 | \$ | - | \$ | | \$ | 2,150 | |
| Foreign Contributions | \$ 39 | \$ | 342 | \$ | 252 | \$ | 10 | \$ | 643 | |
| U.S. Universities | \$ 24 | \$ | 225 | \$ | 103 | \$ | 26 | \$ | 378 | |
| Total | \$ 5,193 | \$ | 4,556 | \$ | 2,028 | \$ | 1,768 | \$ | 13,545 | |